



**UNIVERSITA' DEGLI STUDI DI MILANO**  
**PROGRAMME DESCRIPTION - ACADEMIC YEAR 2018/19**  
**BACHELOR**  
**Geological Sciences (Classe L-34)**  
**enrolled from 2014-2015 academic year**

### HEADING

<b>Degree classification - Denomination and code:</b>	L-34 Geology
<b>Degree title:</b>	Dottore
<b>Length of course:</b>	3 years
<b>Total number of credits required to complete programme:</b>	180
<b>Years of course currently available:</b>	1st , 2nd , 3rd
<b>Access procedures:</b>	Open, subject to entry requirements
<b>Course code:</b>	F65

### PERSONS/ROLES

#### Head of Study Programme

Prof Massimo Tiepolo

#### Tutors - Faculty

Prof. Riccardo Bersezio, Prof Giovanni Grieco, Prof Michele Zucali, Prof.ssa Monica Dapiaggi

#### Degree Course website

<http://www.ccdgeo.unimi.it>

Via Luigi Mangiagalli, 34 piano terra vedi sito [www.ccdgeo.unimi.it](http://www.ccdgeo.unimi.it) Email: [cclsg@unimi.it](mailto:cclsg@unimi.it)

Via Botticelli, 23 riceve quando disponibile o su appuntamento [www.ccdgeo.unimi.it](http://www.ccdgeo.unimi.it) Email: [massimo.tiepolo@unimi.it](mailto:massimo.tiepolo@unimi.it)

Via Celoria, 22/26 Phone numero a pagamento (attivo dal lunedì al venerdì dalle 09.00 alle 17.00) 199188128 orari di ricevimento al pubblico: <http://www.unimi.it/studenti/segreterie/773.htm>

[www.unimi.it](http://www.unimi.it) (scegli la Statale) [www.unimi.infostudente.it](http://www.unimi.infostudente.it)

### CHARACTERISTICS OF DEGREE PROGRAMME

#### General and specific learning objectives

The Master course in Earth Sciences prepares geologists with an in-depth knowledge in various fields of the Earth Sciences offering opportunities of scientific development and employment both in public and private sectors. This degree provides theoretic and practical skills deriving from the field-based and laboratory training, internships and research stages in public and private institutions, national or international.

Some of the teaching subjects, which can offer solid professional opportunities are: (1) Analysis, quantification and modelling of Earth processes interacting within the Planet, on its surface, in the atmosphere and hydrosphere, related to the origin of energy, water and mineral resources. (2) Evaluation and characterisation of natural minerals for their role in geologic processes and with respect to industrial applications. (3) Basic field mapping and thematic mapping for the interpretation of geologic processes/products at various scales. (4) Analysis and interpretation of geological processes interacting with human activities for a balanced use of natural resources and for protection of the environment and archeological and cultural sites. (5) Field surveys and direct/indirect prospecting for the parameterisation of technical properties and behaviour of soils and rocks for wide and small scale engineering plans. (6) Exploration, exploitation, protection and reclamation of underground water resources, after local and diffuse pollution events. (7) Exploration, evaluation and management of natural and energy resources, and of environmental effects of their exploitation. (8) Characterisation and prevention of natural hazards for territorial management.

During the Master in Earth Sciences/"Scienze della Terra", students will acquire theoretical, experimental and practical knowledge in various disciplines of the Earth Sciences and widen their background knowledge in chemistry, physics and mathematics, specialised and related disciplines, as agronomy, and engineering. Students will analyse the complexities of natural processes, transformations of natural resources, human-induced impacts, and propose solutions on the basis of analytical techniques, field mapping methods, and construction of interpretative models. They will properly transfer analytical results into interpretations, using modern software packages.

The aims of the Master are to form Geologists able to: (a) analyse evolutionary processes of geologic systems and obtain models adaptable to engineering applications; (b) develop basic and applied geological research for different sectors of private and public employment, both in academia and industry; (c) recognise and forecast the medium and long term effects of the interaction between various geological processes, anthropogenic impacts, global climatic changes, intervention on

reclamation and conservation of the quality of complex natural systems, individuation of the vulnerability of specific locations, evaluation of intrinsic hazard of geological phenomena interacting with human activities and proposal of risk reduction; (d) operate in industries for treatment of natural and analogue materials, and in similar public institutions, by running analytical laboratories, planning and executing measurements, in agreement with research and development plans, quality controls, and law, or by industrial production processing; (e) operate independently in the professional activities, or employment with public and private companies or State organisations.

These activities and the acquired knowledge can provide expertise in the design of interventions on the territory, even in an interdisciplinary way.

### **Professional profile and employment opportunities**

The graduates from the Earth Science Master will be trained to perform the Geologist autonomous professional activity. The role of Professional Geologist is officially attributed by Ordine Nazionale dei Geologi by means of insertion in Section A (Geologo senior), in accordance with the Italian law D.P.R. 5 Giugno 2001, n. 328; following the successful completion of a national examination (State Exam).

Master graduates will find employment opportunities with research companies, public administrations, professional and consulting companies in Italy and abroad, companies and laboratories for treatment of natural materials.

The various fields of the employment market to which the Master graduate will be able to access, concerning the intellectual, scientific and highly-specialised professional roles acquired, are listed within category 2 ISTAT (2.1.1.5; geologists, geophysicists and other related professions) and are the following:

- Field mapping, updating of geological, technical and thematic maps;
- Planning, execution and interpretation of geophysical and geological investigations for civil engineering; prospecting and characterisation of mineral, water and energy resources, and environmental monitoring;
- Modelling of geologic processes for the analysis of slope instability, underground water circulation and pollutant transport, tunnelling, and related activities;
- Prospecting, evaluation and managing of geological resources, direction of mining and quarrying works;
- Coordination of protection systems in mobile and temporary yards and construction sites;
- Direction of mineralogical, petrographical, sedimentological, geochemical and geotechnical laboratories;
- Territorial planning of hazardous sites and hydrogeological protection systems;
- Environmental monitoring for protection of water resources, reclamation and remediation of polluted aquifers and sites, waste management;
- Control of industrial quality, technical use of geomaterials for mechanical, chemical and electronic industries, use of ornamental stones; gemmology;
- Analysis, reclamation and managing of degraded sites, modelling of geoenvironmental processes and systems, managing, construction site direction, testing and monitoring;
- Managing of Geographic Information Systems, particularly the ones oriented to geoenvironmental studies;
- Protection of cultural and paleontological heritages, monument conservation, geoarchaeology;
- Planning of civil engineering constructions and of environmental and soil protection, in collaboration with related professionals;
- Evaluation of the environmental impact of wide engineering interventions (VIA) and strategic environmental evaluation (VAS);
- Science dissemination and journalism;
- Teaching of Earth Sciences;
- Forensic Geology;

The Earth Science Master represents a preferential title to access to PhD studentships.

### **EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM**

The University of Milan supports the international mobility of its students, offering them the opportunity to spend periods of study and training abroad, a unique opportunity to enrich their curriculum in an international context.

#### **Study and internships abroad**

The department of Earth Sciences offers opportunities for spending time as guest students at European universities and research centres both for attending courses/exams and for research and apprenticeships related to projects for graduate, post-graduate and PhD students. Studying and doing research in foreign universities is not only an important life experience and the occasion for thorough learning of a foreign language, but is also, and primarily, the opportunity for experiencing and acquiring different and more flexible learning approaches. Doing research and apprenticeships abroad may allow the access to facilities not available here (e.g., highly specialized labs), the performance of applied research on specific fields as well as the first-hand interaction with wider, international research groups. At present our partner universities in official Erasmus exchange agreements devoted to course/exams and, where indicated, research activity, are located in France, Germany, Spain, Holland, Switzerland and Turkey. However the agreements for bursaries specifically devoted to applied research/apprenticeships can be stipulated with any other university or research centre with which any members of our department have or may establish collaboration on common research interests. For these research bursaries and, in general, for the correct validation of the research activity done by our students abroad, the role and the active involvement of a local member of the department is of fundamental importance, as he/she will act as official, competent internal scientific tutor for the student hosted in the guest foreign university. Students may access to “normal” Erasmus bursarships, allowing

course/exam in addition to research activities in partner universities, as well as Erasmus Student Placement bursaries exclusively devoted to research/apprenticeship activities. The access to the different types of bursary is done by means of separate application procedures. The activity (course/exam or research) that the candidate will do in the guest foreign university has to be agreed with the local professors/tutors in both original and guest universities by means of the “Learning Agreement”. This document is of prime importance for the final validation and official administrative registration of the activity done abroad.

### How to participate in Erasmus mobility programs

To gain access to mobility programs for study purposes, lasting 3-12 months, the enrolled students of the University of Milan must attend a public selection that starts usually around the month of February each year through the presentation of specific competition announcements, which contain information on available destinations, respective duration of the mobility, requirements and deadlines for submitting the online application.

The selection, aimed at evaluating the proposed study abroad program of the candidate, knowledge of a foreign language, especially when this is a preferential requirement, and the motivations behind the request, is performed by specially constituted commissions.

Each year, before the expiry of the competition announcements, the University organises information sessions for the specific study course or groups of study courses, in order to illustrate to students the opportunities and participation rules.

To finance stays abroad under the Erasmus + program, the European Union assigns to the selected students a scholarship that - while not covering the full cost of living abroad - is a useful contribution for additional costs as travel costs or greater cost of living in the country of destination.

The monthly amount of the communitarian scholarship is established annually at national level; additional contributions may be provided to students with disabilities.

In order to enable students in economic disadvantaged conditions to participate in Erasmus+ program, the University of Milan assigns further additional contributions; amount of this contributions and criteria for assigning them are established from year to year.

The University of Milan promotes the linguistic preparation of students selected for mobility programs, organising every year intensive courses in the following languages: English, French, German and Spanish.

The University in order to facilitate the organisation of the stay abroad and to guide students in choosing their destination offers a specific support service.

More information in Italian are available on [www.unimi.it](http://www.unimi.it) > Studenti > Studiare all'estero > Erasmus+

For assistance please contact:

Ufficio Accordi e relazioni internazionali

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Desk opening hour: Monday-friday 9 - 12

<b>1st COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Chemistry and Laboratory	9	CHIM/03
English	3	L-LIN/12
Geomorphology and Laboratory	10	GEO/04
Introduction to Geology and Laboratory	7	(7) GEO/02, (7) GEO/03, (7) GEO/07, (7) GEO/01
Mathematics I and Information Tecnology	9	(6) MAT/09, (6) MAT/01, (6) MAT/02, (6) MAT/03, (3) INF/01, (6) MAT/04, (6) MAT/05, (6) MAT/06, (6) MAT/07, (6) MAT/08
Mineralogy and Lithology Practicals	10	(10) GEO/02, (10) GEO/06
Paleontolgy and Laboratory	9	GEO/01
Physics I	6	FIS/01
Total compulsory credits		63

<b>2nd COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Mathematics II	6	(6) MAT/01, (6) MAT/02, (6) MAT/05
Mineralogy	6	GEO/06
Petrography and Laboratory	10	GEO/07
Physics II	6	FIS/01
Physics of the Earth and Laboratory	9	GEO/10
Sedimentary Geology and Laboratory	10	GEO/02
Structural Geology and Tectonics and Laboratory	10	GEO/03
Total compulsory credits		57
<b>3rd COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Engineering Geology and Laboratory	9	GEO/05
Geochemistry	6	GEO/08
Geological Mapping and fieldwork practicals	9	(9) GEO/02, (9) GEO/03, (9) GEO/07, (9) GEO/09
Georesources	9	GEO/09
Topography and GIS	6	ICAR/06
Total compulsory credits		39
<b>Elective courses</b>		
Applied Geophysics	6	GEO/11
Applied Mineralogy I	6	GEO/06
Facies Analysis	6	GEO/02
Geotechnical field test and mesures	6	GEO/05
Palaeoecology	6	GEO/01
Photogeology	6	GEO/04
Raw Materials and Industry	6	GEO/09
Structural Analysis I	6	GEO/03
Volcanology	6	GEO/08
<b>End of course requirements</b>		
Final Dissertation	4	ND
Training	5	(5) GEO/02, (5) GEO/03, (5) GEO/04, (5) GEO/05, (5) GEO/06, (5) GEO/07, (5) GEO/08, (5) GEO/09, (5) GEO/10, (5) GEO/01, (5) GEO/12, (5) GEO/11
Total compulsory credits		9

## COURSE PROGRESSION REQUIREMENTS

The exams of the elective courses must be incurred after the characteristic of the same scientific-disciplinary or related fields; they must also comply with the following mandatory prerequisites:

<b>Learning activity</b>	<b>Prescribed foundation courses</b>	<b>O/S</b>
Engineering Geology and Laboratory	Structural Geology and Tectonics and Laboratory	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
Physics of the Earth and Laboratory	Physics I	Core/compulsory
Physics II	Physics I	Recommended
Physics I	Mathematics I and Information Tecnology	Recommended
Geological Mapping and fieldwork practicals	Petrography and Laboratory	Core/compulsory
	Structural Geology and Tectonics and Laboratory	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
Georesources	Petrography and Laboratory	Core/compulsory
	Structural Geology and Tectonics and Laboratory	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory
Petrography and Laboratory	Mineralogy and Lithology Practicals	Core/compulsory
	Mineralogy	Core/compulsory
Structural Geology and Tectonics and Laboratory	Petrography and Laboratory	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
Mathematics II	Mathematics I and Information Tecnology	Core/compulsory
Sedimentary Geology and Laboratory	Mineralogy and Lithology Practicals	Core/compulsory
Mineralogy	Chemistry and Laboratory	Recommended

	Mineralogy and Lithology Practicals	Core/compulsory
Geochemistry	Chemistry and Laboratory	Recommended
	Mineralogy	Recommended